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Compound, comminuted and complicated fracture of the upper end of the tibia.

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COMPOUND, COMMINUTED

AND

COMPLICATED FRACTURE

OF THE

UPPER END OF THE TIBIA.

BY ALDEN MARCH, M. D.,

ALBANY.

ALBANY:
PRINTED BY CHARLES VAN BENTHUYSEN.
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FRACTURE OF THE UPPER END OF THE TIBIA.

It has been remarked, that "he who makes two blades of grass to grow, where there was but one before, is a real benefactor of mankind."

It is upon the proposition, that every additional fact in support of a principle, contributes to augment the sum total of human knowledge, that we venture to present for the consideration of the society, a brief history of an interesting case of compound, comminuted and complicated fracture of the upper end of the tibia.

We shall not pretend to suggest anything new in our case, either as to history, cause, pathology, treatment or result. Our aim will be to direct the attention of the profession to the proper investigation of those means of knowledge, by which we may act with a full appreciation of the immense responsibilities attached to the practical duties of surgery.

If we shall be so fortunate as to succeed in our humble endeavors, we shall feel abundantly rewarded for the time devoted to the subject; and for another, among the many we have experienced in a somewhat long professional life, of those deeply touching and intensely trying scenes, we so often encounter in the discharge of our professional duties.

The terms *compound*, *comminuted* and *complicated*, as employed in the language of surgery, may require a word of explanation; not however, especially for the benefit of the members of this learned and practical body of physicians and surgeons; but as our paper may be useful to the medical student, and to the novitiate in surgical science, into whose hands it may possibly fall, I trust it will not be deemed improper here, to explain briefly, the terms embraced in the title of our paper.

A fracture is called *compound*, when there is a wound of the skin over the seat of the fracture, and communicating with it.

1. A compound fracture may be caused by the same violence which produced the solution of continuity of the bone.

2. It may be produced by a fragment of bone being thrust through the skin.

3. It may be caused by subsequent ulceration, or sloughing of the integument, and other soft tissues, situated over the seat of the fracture.

A fracture is said to be *comminuted*, when the shaft of a bone is shivered or broken into several fragments.

When a large *artery* is *wounded*—a large nerve injured—a large joint implicated, either with dislocation or with vertical fracture, extending into the cavity of a joint, and in connection with the site of the broken bone, it is called a *complicated* fracture.

It was the first circumstance, that of a *wounded artery*, though at the same time *compound* and *comminuted*, which rendered our case more especially dangerous, and difficult to manage.

The history of the case which is to furnish the topic of our remarks, is as follows:

Mr. G. Moyer, aged 32, a farmer by occupation, of slender make, dyspeptic, and of industrious and temperate habits, while engaged in the management of a threshing machine, propelled by horse-power, on the 18th day of September, 1860, met with the accident which we have called a *compound*, *comminuted* and *complicated* fracture of the upper end of the tibia.

It appears that by increased velocity, the driving wheel of the horse-power machine, burst into several pieces, one of which struck Mr. M. on the anterior and inner face of the tibia, just below the knee-joint. By accident the band, or belt of the driving wheel was detached, so that the usual resistance was suddenly removed, and as a consequence the horses were forced into a rapid movement. To protect his horses from being injured, Mr. Moyer ran instantly to the break, to apply which, brought him in proximity with the wheel, at the very instant it burst.

Some idea may be formed of the violence inflicted upon the limb of Mr. M., when it is stated by an eye witness, that the wheel was rent into many fragments, of varying size; one of which, of about two feet in length was thrown out of the barn-door, a distance of one hundred feet, and that another portion flew off vertically, and when at the height of twelve or fifteen feet came in contact with the roof of the barn, through which

[illegible] amputation.

[illegible] of the bone, and from [illegible] of the accident up to

[illegible] anterior tibial artery.

[illegible]

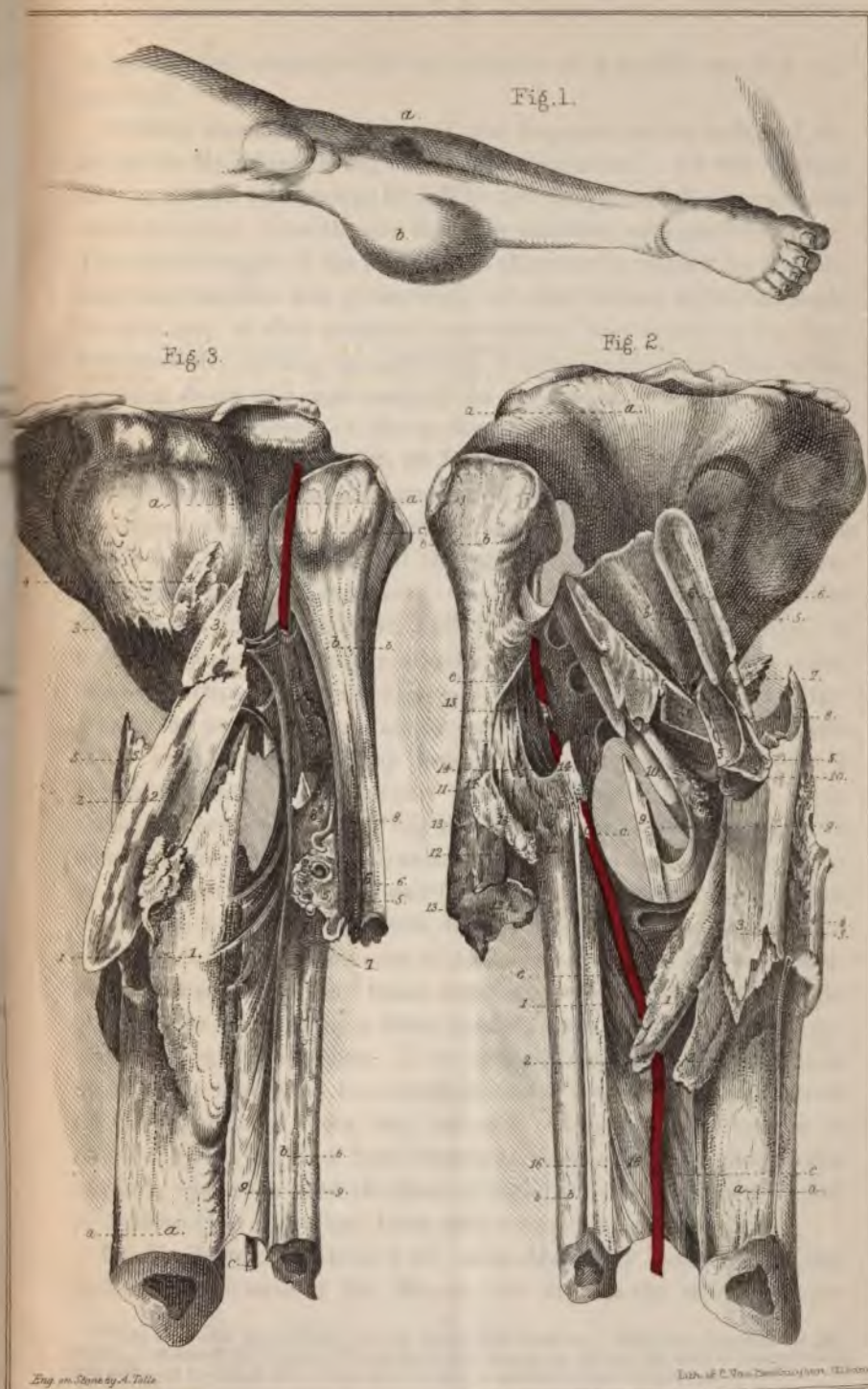
Fig. 1.
Fig. 3.
Fig. 2.
Eng. on Stone by A. Tolle

it penetrated, almost with the velocity of a swiftly moving cannon ball.

Neither the size nor shape of the fragment which inflicted the injury to Mr. Moyer's leg could be ascertained. At the instant he was struck on the leg, he fell to the floor; and the horses, one after the other, were thrown from the machine with great violence. The first thought of the patient, as afterwards related by himself, was that the floor had given way, and that he had fallen through. He was not, at that moment, conscious of any injury to his leg; but instantly sprang up, and walked some eight or ten feet, when he sank down and was carried to his house. Within an hour from the occurrence of the accident, Dr. Parr saw the patient, and soon after Dr. Snyder, of Fort Plain.

The doctors found the mutilated leg wrapped in cloths, and the blood stanched, the exact amount of which the patient lost could not be estimated, but the physicians inferred it was considerable, from the saturated condition of the cloths, from the appearance of the patient, and from the state of his pulse, it being over one hundred in a minute. It will be proper to state, however, that they were disposed to attribute some of this frequency of pulse to great alarm and anxiety, and to a nervo-irritable temperament. They found the limb lying nearly in a straight position, the patient suffering from severe pain, very anxious, declaiming the "leg never could be saved," urging to have it immediately cut off, and even asked the doctor to "put him out of misery." On the outside of the leg, about four inches below the knee, and opposite to the wound of the skin, which communicated with the seat of the fracture, there was a circumscribed, hard or rather tense swelling, of about four inches in diameter at its base, of a blunt conical form, and elevated, at its center, about two inches. It is thought that this swelling took place quite soon after the accident, since it was at once observed by the physicians when they arrived. From the appearance of the bloody cloths, and from inquiries made of the friends of the patient, who witnessed the flow of blood, the physicians were led to believe that there had been only a venous hemorrhage.*

Dr. U. Potter, to whom I am more especially indebted for the history of the case of Mr. Moyer, saw him on the third day, as-

* Since the above was written, even as late as this morning, I have been informed by Dr. Potter, that one of the friends of the patient, who was on the spot at the time of the accident, told him that the blood flowed from the wound in a continuous and projecting stream.

sisted in dressing the limb, and on that occasion arrived at the same conclusion as that of Drs. Parr and Snyder, in relation to the character of the hemorrhage. The blood which escaped from the wound might have been partly venous and partly arterial; mingled in such a manner as not to be easily determined to which of the systems it principally belonged.

At the time of reducing the fracture by manipulating and pressing down the shattered fragments of bone, no bleeding recurred. But in about six days after the first dressing, there was slight bleeding, amounting to only one or two ounces, which did not seem to affect the patient, except by slight excitement. The bleeding recurred at intervals of six or seven days during the first four weeks; and at each time only enough to saturate the dressings. During the next three weeks there was no recurrence of bleeding, the swelling decreased, the health and cheerfulness of the patient improved, and the physicians and friends began to entertain hopes of an ultimate though slow recovery. At the end of the seventh week moderate bleeding again recurred, and, as in the other instances, ceased spontaneously. On the eighth week there was a similar attack of bleeding to that above mentioned which resulted in the same way. Again at the middle of the ninth week there was a profuse and rapid hemorrhage, which was estimated by Dr. Parr and the family to amount to a quart. "It ran off in five minutes," and stopped suddenly of its own accord. This last loss of blood prostrated the patient very much, and was the means which induced the physicians and friends to send for me, with the probable necessity of amputating the limb. This took place on Friday; and on the following Monday evening, I visited, in consultation with Drs. Parr, Snyder and Potter; the patient, whom I found pale, anxious and desponding, with an irritable pulse and cool skin. On uncovering the limb, I observed an ulcer about as large as the thumb nail, at least the borders of one, just below the tubercle of the tibia, while the floor of it was occupied with a portion of exposed and dead bone, which was readily removed. An elastic, boggy swelling occupied the same position, and was of the same size of that already described as having occurred a short time after the injury was inflicted. It was agreed that this swelling contained either pus or coagulated blood, most likely the latter; and that in either case it would be proper to open it.

Accordingly a free and deep incision, with a scalpel, was made

into it, on the outside of the leg, by which was exposed a large coagulum of dark or black blood, which was removed by the fore finger. After rolling out about two-thirds of the black clot, and on thrusting the finger deeper, as it were, between the tibia and fibula, suddenly bright arterial blood flowed rapidly; to arrest which, the inguinal artery at the groin was instantly compressed, and a piece of sponge was crowded deep into the bottom of the wound. At this moment I made the announcement, imprudently perhaps, in the hearing of the patient, that "this decided the fate of the limb." Between the loss of from eight to twelve ounces of arterial blood, and the idea of the loss of his limb, the most alarming and almost fatal result followed. He took a farewell leave of his friends who were gathered around his bed, and appeared resigned to await, and even to welcome death, which he seemed to regard as being near at hand. After a short time, by the aid of stimulants and some consoling words, the patient became calm, and dictated to Dr. Potter what he desired to be incorporated in his last will and testament, which was written out and duly executed.

In the early part of the evening we hardly supposed he would rally from his sunken condition. But by the persistent use of stimulants, opium and liquid food, and by as much encouragement of recovery, if he submitted to amputation, as we could conscientiously bring to bear upon the mind of the patient, for eight or ten hours, it was thought best to operate, which we proceeded to execute between three and four o'clock of the morning of Tuesday, just nine weeks from the day of the accident. The limb was amputated just above the knee—employed no anæsthetic, —artery compressed at the groin,—lost but little blood, and seemed to sustain the operation remarkably well.

After the operation he had a pulse of one much exhausted, frequent and gaseous; and for the first half day complained of considerable pain, afterwards he manifested much "uneasiness" quite up to the time of his death, which took place on the ninth day after amputation.

The stump was dressed for the first time on the Sunday following the operation, when the reporter, Dr. Potter, states that "it never discharged much, there was no bleeding, not even enough to stain the bandage nearest the stump, which looked pale and felt flabby, and exhibited no attempt at ulceration, even around the sutures.

It is rather remarkable that, notwithstanding the severe comminution of the bones, and the extensive injury of the soft parts, there was not at any time, but the slightest disposition to suppurate; nor but very little effort to deposit new bony material. It appears that healthy reaction never took place; that he lost all appetite and relish for food; that his skin was more or less hot; that he had mild thirst, slight chills and occasional delirium; and that about twenty-four hours before his death be became comatose, and continued so, with the exception of a short, lucid interval, until death closed the earthly career of our patient.

To the interrogatory, "What was the immediate cause of death?" which I submitted to Dr. Potter, he makes the following reply: "I would say, loss of the life-pabulum, the blood, with a perfectly alienated assimilative power." For years the patient had suffered from dyspepsia; and from the shock to the system produced by the original injury, by the repeated bleedings, and by the depressing effect of the operation, I think we can very easily comprehend the condition described, or the theory advanced by Dr. Potter.

Having given the history and result of the case of Mr. Moyer, let us endeavor to deduce therefrom some practical lessons, which may be arranged under the heads of pathology, diagnosis and treatment.

It is not always easy to determine the true pathological condition of all the tissues involved in a lesion of the kind now under consideration. The wound in the soft parts leading to the seat of the fracture, may be so limited as to afford only imperfect means of examining the condition of the fragments of the shattered bone or bones; and of ascertaining the nature of the injury to the blood vessels and large nerves. Nor by any means, should the age, the state of health, the constitution, and the temperament of the patient, be overlooked. An injury which might be fatal to the limb or life of one, might scarcely be regarded as dangerous to another.

There are two classes of cases of compound fracture, whose pathological condition will lead at once to correct diagnosis, and consequently to correct treatment. It is correct in principle to say, that all compound fractures are more or less dangerous; and yet we have seen and treated many cases, where the breach in the soft parts was so limited, and where they were promptly restored by union of the first intention, that the fracture was at

once reduced to a simple one, and relieved of all the dangers of a compound fracture. We may have cases where the solution of continuity of the bone may be simple, and the wound of the soft parts around the seat of the fracture not at all extensive, though in such a condition as to prevent union by the first intention; and yet neither the limb nor life of the patient essentially endangered.

Again, there is another class of cases of compound fracture, so extensive and so serious in their nature, as to preclude all possibility of saving both the life and limb of the patient. A moderate amount of knowledge of the laws of vitality, of the recuperative powers of nature, and of the resources of the art and science of surgery, will enable us to arrive at a correct conclusion, as to the line of duty, in the treatment of such cases.

It is said that there are fashions in physic as well as fashions in dress and etiquette.

In the course of my professional life, I have witnessed the rise and fall of many theories and modes of practice in the department of medicine proper, among regular and irregular practitioners.

Our distinguished countryman, Dr. Benj. Rush, abstracted blood in the treatment of almost all diseases. In less than half a century the practice, if not the author of it, is hardly known to the younger and middle aged physicians of the present generation.

The Brunonian theory was that all diseases were either *sthenic* or *asthenic;* and that the treatment should be either depletion or stimulation.

With Broussais, everything was gastero-enterite; the treatment, starvation and gum-water.

Not many years since, the Thompsonian doctrine, the red-pepper practice, was in full vogue in this city. Now the last of this tribe of irregulars have doffed the sign of "Botanic and Thompsonian Doctor," and have "hung out their shingle" labelled "Doctor;" and with still greater effrontery, I believe they claim to be "M. D.'s."

Hydropathy has had its day; and I think the signs of the times indicate the fast approach of the day when Homœopathy will be buried in the "Tombs of the Capulets." As an evidence of the unfairness and dishonesty of the principles they pretend to inculcate, of the false colors under which they sail, and of the unsatisfying honor attached to the title of their boasted superiority of

medical treatment of diseases, I will inform those who may not already know the fact, that during the session of the last Legislature, a charter for the incorporation of a Homœopathic College was granted to an association of individuals for the purpose of teaching Homœopathy, and of conferring the degree of "Doctor of Homœopathy" upon their pupils. I have been informed, that at the time they obtained their charter, a strenuous effort was made to strike out the term "Homœopathy," and to insert "Medicine."

It is here proper to state, that we are indebted to the zeal and perseverance of an able State Senator of our profession, for having defeated the design of a body of incorporated irregulars, from not only sailing under false colors, but from appropriating a time-honored title, which can only be claimed by those who have passed through a thorough education and rigid examination for the degree of Doctor in Medicine.

This same "Homœopathic College," as its friends dignify it, is now besieging the present Legislature for an amendment to their charter, to enable them to confer the degree of Doctor of Medicine!

We say, if they can satisfy themselves with *homœopathic doses of medicine*, let them be satisfied with *homœopathic doses of honor.* Let them be homœopathic doctors—nothing more, and I am quite sure they can be *nothing less.*

I hope to be pardoned for this digression from our subject. I was about to say that there are fashions in surgery as well as in medicine. At one time the *art* of surgery, the manipulations of the hands, and the use of the knife were in popular favor. At another time the *science* of surgery rose superior to the ingenuity of the mere mechanic, and brought to its aid the resources of nature and of medicine.

Conservative surgery, or the art of preserving any constituent part of the human system, instead of removing it with the knife, should find lodgment in the mind of every honest and practical surgeon.

Let us see how far the light of science and experience will aid in solving the question under consideration.

James Miller, in his "Principles of Surgery," under the head of compound fracture, says: "The surgeon's first care is to ascertain whether any attempt ought to be made to save the limb. In the slight cases there is no difficulty; but in those of severity and complication, much careful and anxious thought, tempered by

reference to past experience, is required ere a just determination can be attained. In all cases of what may be termed decided doubt, it seems to be reasonable that the limb should have the benefit of that doubt."

Let it here be remarked that the attending physicians, in the case of Mr. Moyer, were disposed to give his limb "the benefit of that doubt." And we think, under the circumstances, that they made a laudable effort to save an important member, for an individual whose occupation and position in society, demanded all reasonable and prudent endeavors to do so. Perhaps it may be said that a more accurate diagnosis would have enabled the same physicians to decide upon immediate amputation, with a pretty fair prospect of saving the life of the patient. We will admit, that if all the injured parts could have been brought under the inspection of the eye, as fully before as after amputation, the decision would have been in favor of a prompt operation.

Again, Miller remarks: "It is not easy to lay down definite rules for guidance in regard to such primary amputations. But the following circumstances may be safely stated as adverse to a favorable prognosis.

"Comminution of the bone, or fracture at several points; extension of the fracture into an important articulation; an open state of the joint; much bruising and laceration of the soft parts, rendering extensive sloughing inevitable with a risk of gangrene invading the whole limb, and with a certainty of extensive and tedious suppuration following separation of the sloughs; laceration of a *large artery*, as evinced either by hemorrhage, or by rapid formation of a large bloody swelling; old age, and enfeeblement of the frame by disease, privation, intemperate habits, or other causes."

In our case, there was "extensive comminution of the bone;" "laceration of a large artery," comparatively; and enfeeblement of the frame by disease, dyspepsia; three of the circumstances being present which would present claims for immediate amputation.

Erichsen says: "When one of the larger arteries of the limb has been wounded by the violence that occasions the fracture, or has been lacerated by the broken bone, there may be copious arterial hemorrhage externally, as well as extravasation into the general tissue of the limb. These cases most commonly require immediate amputation." He adds: "In these cases it has been proposed, by surgeons of great eminence, to enlarge the wound

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in the limb, or to make an incision down to the fracture, and to attempt to tie the artery where it has been injured. In most cases, however, this is scarcely practicable, as the surgeon would have to grope in the midst of bleeding and infiltrated tissues, and would experience the greatest possible difficulty in finding the wounded vessel, after a search which would materially tend to increase the disorganization of the limb."

To enable us to decide upon the propriety and necessity of immediate amputation, Miller says, that "much careful and anxious thought, tempered by *past experience*, is required, ere a just determination can be attained." We would ask, how many of us, even those who are practical surgeons, can fall back upon *past experience* in cases analogous to that of Mr. Moyer? In a practice of over forty years, the greater portion of which has been devoted to the treatment of surgical cases, I am free to confess, that I have never before met with a case of precisely the same character. When we consider the deep situation of the anterior-tibial artery at a short distance below the point where it perforates the inter-osseous ligament, between the heads of the tibia and fibula, and its firm and unyielding attachment to the surrounding parts, we should be very likely to entertain but little hope of success attending our efforts to secure it by ligature.

It is a well known fact that an artery when partially divided is more likely to bleed than when completely severed. And I think we may infer from the periodic character of the hemorrhage in the case of Mr. Moyer, that as the circulating system filled up with blood, and as it gathered force, the temporary clot was removed from the wound in the artery, and that hemorrhage was the result.

We are, therefore, forced to the conclusion, that early amputation affords the only chance of saving life, in similar cases and under similar circumstances.

ALBANY, *February*, 1861.

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